

Remarks:

3. Claims 1, 10, 18, 25, 26, 28, 29 and 35 were rejected due to various informalities in the use of articles of speech concerning antecedent basis in these claims. These claims have now been amended to overcome this rejection.

4 and 5. The rejection of all of the claims of the case (1-35) for omitting essential matter is respectfully transversed since it appears the Office is not fully appreciative of the claimed invention being directed to a novel firetrain arrangement which addresses a long standing deficiency in the art. Before discussing the merits of the claims, applicants would like to review the reason for the motivation behind the inventive micro-scale firetrain and point out the relationship between the claims and the various embodiments of the invention disclosed in the specification. Claims 1-17 are directed to a first embodiment, which is illustrated in Figs 1 – 4. Claims 18 – 25 are directed to a second embodiment illustrated in Figs 5 – 6C. Claims 26 – 28 have been cancelled. Claims 29 – 35 are directed to a third embodiment shown in Figs 7a and 7b.

Each set of claims includes claims to both a firetrain incorporating a safe and arm feature and a safe and arm device incorporating the firetrain. Concerning the 112 rejections, it appears the Examiner did not receive claims directed to a firetrain, as opposed to those directed to a safe and arm device. It is respectfully submitted that there is no failure by Applicants to set forth claim limitations defining their invention and there is no omission of essential material. In each claim, all of the components are defined in a

specific geometrical relationship, which is key to enabling the micro-scale approach to the firetrain. This novel arrangement cannot be dismissed as electing among design options since such components enable pyrotechnic operation of a firetrain on a scale for small caliber munition, which heretofore did not exist.

Certain language concerning cooperative functioning and operability of the claimed combination of elements has been added by amendment. For example, claim 1 calls for a firetrain for transmitting a detonation from its input to its output. Also the input explosive column is recited as being at the input and the receptor charge is recited as being at the output. Similar language has been added to the other claims such as claims 9, 10, and 18. Although applicants maintain that the cooperation between the respective elements of the claim were apparent, the new language removes all possibility for lack of clarity. Therefore, these amendments fully overcome the rejection made by the Office.

The 35 USC 112 rejection directed to some of applicants claims is not understood and particularly the position of the Office that essential material is not recited. Applicants' invention is a micro-scale firetrain, which includes both the detonator function and the safe-and-arm functions. Both of these functions have been issued numerous patents in the prior art specific to only one of the functions. The nature of applicants' invention is recited in the pending claims and is fully set forth in a manner, which distinguishes over the known prior art. This includes all of the cited art relevant to this case whether or not applied or relied on by the Office. It is clear from both the claims and the disclosure how the present invention is implemented and

used to interface to advantage in numerous fusing applications with known components in the art pertinent to the invention. Also the safe and arming feature by itself in the prior art has been found to be worthy of numerous issued patents. Since this claimed structure is novel and distinguishes over the prior art, it is respectfully submitted that it warrants patentable protection and fully complies with 35 USC 112.

To aid in understanding of the relevant prior art, applicants have enclosed a five-page written description of the M100 detonator including its physical dimensions.

If this point or any other issue raised by Applicants in this response is not evident to the Office, Applicants would like to schedule an interview with the Examiner to provide a fuller appreciation for this technology of the invention while addressing any concerns or questions the Office may have in order to facilitate the prosecution of the case. Applicants' attorney will seek the Examiner by telephone to set up this interview. Applicants' attorney may also be contacted at 973-724-6590 concerning this request for an interview.

Applicants inventive approach to the novel firetrain enables all the components of firing and arming functions to be physically implemented with components of extremely small size but which also provide an improved margin of safety and reliability while achieving precision in their operation. First, such functions have to be capable of withstanding setback acceleration and spin-induced centrifugal forces before reliably allowing the munition to be armed. Then the munition can be utilized for targeting. Prior

art firetrain arrangements are bulky so as to occupy large volumes making their deployment in small munitions such as 20 mm munitions unachievable. In order to provide appropriate fusing functions in such small munitions or ammunition, all components including the firetrain must be on the same small order of micro miniaturization. Such fusing functions are necessary to make small munitions function intelligently to increase their effects on enemy personnel or other targets of opportunity. It should be kept in mind that these intelligent fusing functions are equivalent to the central arming functions deployed in conventional missiles technology and also other large-scale munitions wherein many more orders of magnitude of space are available. Besides the fact that much smaller space is available, there is intense competition for the space because the more space utilized for the fusing function the less space available for the payload of explosive material or other critical components to the functionality of small munitions.

The undersigned has reviewed the cases cited by the Examiner. While the cases recite some language corresponding to the quoted words or phraseology in the Office Action, this language is not a general ruling but rather fact specific comments regarding specific claim limitations relative to their specific factual situations. Since there is no factual basis in any of the cited cases comporting with the factual situation of the present invention, none of the cited cases stand for a general proposition of law relevant to applicants' invention or as a basis for not recognizing the recited limitations set forth in the pending claims. For example, the statement for size as not being a consideration for making a claim limitation amounting to patentable novelty does not apply to applicants' invention. The reason for applicants' motivation is that the size of the physical components makes the difference

of being able to provide an important fuzing function in small caliber ammunition. Therefore it is respectfully submitted that when size or miniaturization makes something possible that was previously unattainable, it is an enabling novel feature of patent worthy consideration.

Claim 1 recites the specific geometrical relationship of the input explosive column, the receptor charge, and the transfer charge, which is not present or suggested in the prior art. This geometrical relationship enables a compact configuration for the firetrain that provides a new architecture that has several advantages and features over prior art arrangements. First, there is a vast size advantage or miniaturization. Second, the geometrical relationship increases the safety factor, which is an important operational advantage. Instead of the components being collinear which is prevalent in prior art arrangements, the inventive arrangement features a non-collinear arrangement of displaced columns bridged by a transfer charge having both a safe (uncoupled) and armed (coupled) position. This unique geometrical relationship increases the safety factor of the safe position due to the geometrical dislocation or displacement of the components of the inventive firearm. The further advantage is the small size of the transfer charge, which is easily moved between the safe and the armed positions. Beyond specific implementations in the various embodiments, the unique claimed geometrical relationship serves to distinguish claim 1 over all the known prior art. Therefore, reconsideration of claim 1 as well as the other amended claims is respectfully requested. It is further submitted that upon such reconsideration, claim 1 is worthy of allowance and such action and should be granted.

In view of the foregoing, reconsideration and allowance of all of the pending claims as amended is earnestly solicited so that the case may pass to issue.

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DATE

Respectfully submitted,



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Drawings

2. New formal drawings are also included to correct the margin requirements and size of the reference numerals in Fig 3 in accordance with PTO-948. This case was filed using EFS (first version) and the margins in the print outs were largely a function of that version of EFS which is now corrected.